

Date: March 1, 1974

To: ERTS Contracting Officer  
Code 245  
Greenbelt, Maryland 20771

ERTS Scientific Monitor  
Code 650  
Greenbelt, Maryland 20771

ERTS Technical Officer  
Code 430, GSFC  
Greenbelt, Maryland 20771

NASA Scientific and Technical  
Information Facility  
Attn: ERTS Resources  
P.O. Box 33  
College Park, Maryland 20740

ERTS Project Scientist  
Code 650, GSFC  
Greenbelt, Maryland 20771

Mr. J. H. Boeckel  
Code 430  
NASA/GSFC  
Greenbelt, Maryland 20771

From: James V. Drew, Principal Investigator (UN-062)  
412 Administration Building  
University of Nebraska  
Lincoln, Nebraska 68508

Re: Progress Report (Type I)

The following progress report summarizes work accomplished during the period January 1, 1974 to March 1, 1974 according to article II, Item 3 of the contract schedule included in contract NAS5-21756.

- a. Proposal to evaluate the use of ERTS-1 imagery in mapping and managing soil and range resources in the Sand Hills region of Nebraska (MMC #020).
- b. GSFC Identification number of Principal Investigator; UN-062.
- c. At this time there are no significant problems impeding the investigation.
- d. Mosaics (spring 1973 and winter 1974) of ERTS-1 imagery have been constructed at a scale of 1:500,000 for the Sandhills region. Recently acquired winter imagery with snow cover and low sun angle combined with spring imagery will allow construction of a region-wide soil association map. Our January 1974 Type II report describes the development of the capability to discriminate soil associations by use of multitemporal imagery.

Comparisons have been made between radiance values of MSS band 5, image 1043-16552, 4 Sept., 72, as supplied by the Remote Sensing Center, Texas A & M University and vegetative biomass values determined in the field. A computer printout of the portion of Cherry County which contains 5 study sites allowed calculation of average radiance values for the management units which contained the study sites. Good agreement was shown between calculated radiance values and optical density of the positive transparency. A decrease in radiance values was associated with an increase in vegetative biomass in the same way as an

E74-10348) PROPOSAL TO EVALUATE THE USE  
OF ERTS-1 IMAGERY IN MAPPING AND  
MANAGING SOIL AND RANGE RESOURCES IN THE  
SAND HILLS REGION OF NEBRASKA Progress  
(Nebraska Univ.) 11 p HC \$4.00 CSCL 08B

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increase in optical density was associated with an increase in vegetative biomass. In both cases the relationship was not linear. Radiance values were clustered in the printout (one symbol representing a grouping of radiance values) probably resulting in obtaining slightly less than maximum in comparison between sites. Attempts are currently under way to obtain the necessary CCTs and programming to develop the capability of further examination of radiance values and their relationship to vegetative biomass.

Additional calculations of average radiance values were made by Texas A & M for four lakes in the same area in bands 4, 5, 6 and 7 of MSS 1043-16552. When comparing average radiance values with water analysis for total of 6 inorganic ions, radiance values for bands 4 and 5 approached linearity in increase in radiance value in relation to increase in total ions in the water. The relationship between radiance values and water quality were similar for bands 6 and 7, but not linear. Increase in radiance values for these bands with high quality water would suggest the possibility of other factors contributing to the total reflectance pattern.

If radiance data acquisition permits, relationships of radiance values will be evaluated in relation to water quality and vegetative biomass over the 1973 ground truth collection period. Since ion concentrations remain relatively constant in the lakes over this period, this suggests the possibility of using lake radiance values as a means of equating radiance values from image to image.

Preparations have begun in writing the final report for the project.

e. Increase in radiance values is directly related to decrease in vegetative biomass, though not in a linear manner. Should the relationship hold true over an entire growing season, this would allow an extremely rapid evaluation of range condition. Computer access by remote terminal would allow production of this type of range condition evaluation in near real time, which is essential if grazing practice decisions are to be made based on satellite imagery acquisition. Negating the manipulation of photographic products appears to be the logical way to provide satellite imagery data to the user in near real time.

There appears to be a direct linear relationship between radiance values of bands 4 and 5 and increase in total inorganic ions (6 ions) of lakes in the Sandhills region. Consistent ion concentration of lakes during the year could allow their radiance values to serve as a means of equating radiance values from image to image.

f. A paper entitled "Soil Associations and Satellite Imagery in the Sand Hills Region of Nebraska" by D. Lewis, P. Seevers and J.V. Drew has been completed for submission to the Proceedings of the Soil Science Society of America.

g. No recommendations are being offered at this time.

h. No changes in standing order forms have been initiated during this reporting period.

i. Enclosed are image descriptor forms for imagery received during the reporting period.

- j. On January 23, 1974 linear density transparencies as described in ERTS Investigators' Bulletin, Vol. A, No. 15 were ordered for scenes 1061-16552-5 (22 Sep. 72) and 1296-17020-5 (15 May 73). These scenes were ordered for use in facilitating the interpretation of total vegetative biomass from MSS band 5. As yet we have not received these images.
- k. No additional information is available at this time.

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GSFC 37-2 (7/72)

**ERTS IMAGE DESCRIPTOR FORM**  
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DATE March 1, 1971

PRINCIPAL INVESTIGATOR Dr. J. V. Drew

GSFC UN-062

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PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1546-16471-4	X			Snow cover
1546-16471-6	X			Snow cover
1546-16471-7	X			Snow cover
1546-16465-M	X			Snow cover
1543-16291-M	X			Snow cover
1543-16294-M	X			Snow cover
1566-16571-4		X		Snow cover
1566-16571-5		X		Snow cover
1566-16571-6		X		Snow cover
1566-16573-M			X	Snow cover
1566-16580-M	X			Snow cover
1548-16574-4		X		
1548-16574-5		X		
1548-16574-7		X		
1548-16581-4			X	Snow cover
1548-16581-5			X	Snow cover
1548-16581-7			X	Snow cover

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PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland		
1311-16450-M	X			
1311-16453-M	X			
1316-17132-M		X		
1316-17134-M		X		
1508-16353-M	X			
1496-17101-M		X		
1496-17110-M		X		
1496-17103-M		X		

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PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1385-16554-M			X	
1385-16560-M	X			
1383-16444-M	X			
1399-16323-M	X			
1388-17122-M		X		
1406-17123-M		X		
1405-17062-M		X		
1405-17065-M	X			
1386-17010-M		X		
1386-17012-M			X	
1386-17015-M	X			
1403-16545-M	X			
1403-16552-M			X	
1403-16554-M	X			
1402-16494-M	X			
1402-16500-M	X			
1401-16433-M	X			
1401-16435-M	X			
1401-16442-M	X			

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PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1400-16375-M	X			
1400-16381-M	X			
1400-16384-M	X			
1399-16325-M	X			
1515-17153-M		X		
1370-17124-M		X		
1370-17130-M		X		
1383-16435-M	X			
1383-16441-M	X			
1382-16380-M	X			
1382-16385-M	X			
1530-16582-6		X		
1530-16582-7		X		Snow cover
1530-16585-4			X	Snow cover
1530-16585-6			X	Snow cover
1530-16585-7			X	Snow cover
1530-16591-4	X			Snow cover
1530-16591-7	X			Snow cover
1530-16580-6		X		Snow cover
1530-16580-7		X		Snow cover

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PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1369-17072-4		X		
1369-17072-5		X		
1369-17072-6		X		
1405-17071-M	X			
1369-17074-5	X			
1369-17074-6	X			
1369-17074-7	X			
1400-16395-M		X		
1400-16402-M		X		
1507-16301-M	X			
1507-16304-M	X			
1507-16310-M	X			
1494-16584-M		X		
1404-17004-M		X		
1494-16590-M		X		
1404-17010-M			X	
1512-16591-M			X	
1404-17013-M	X			
1512-16594-5	X			
1512-16594-6	X			
1512-16594-7	X			
1385-16551-M	X			

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PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1529-16524-4	X			Snow cover
1529-16524-5	X			Snow cover
1529-16524-7	X			Snow cover
1529-16530-4			X	Snow cover
1529-16530-5			X	Snow cover
1529-16530-7			X	Snow cover
1529-16533-M	X			Snow cover
1528-16470-4	X			Snow cover
1528-16470-6	X			Snow cover
1528-16470-7	X			Snow cover
1528-16472-6	X			Snow cover
1528-16472-7	X			Snow cover
1528-16463-M	X			Snow cover
1527-16405-M	X			Snow cover
1527-16411-M	X			Snow cover
1527-16414-M	X			Snow cover
1527-16420-M	X			Snow cover
1532-17095-M		X		Snow cover
1532-17101-M		X		Snow cover
1532-17104-M	X			Snow cover

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PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1495-17042-M		X		
1495-17045-M		X		
1495-17051-M	X			
1495-17054-M	X			
1493-16530-M	X			
1493-16532-M	X			
1493-16535-M			X	
1493-16541-M	X			
1492-16471-4	X			
1492-16471-5	X			
1492-16471-7	X			
1492-16474-4	X			
1492-16474-5	X			
1492-16474-7	X			
1492-16480-4	X			
1492-16480-5	X			
1492-16480-7	X			
1510-16470-4	X			Snow cover
1510-16470-6	X			Snow cover
1510-16470-7	X			Snow cover
1514-17095-M		X		Snow cover
1514-17101-M		X		Snow cover
1514-17104-M	X			Snow cover
1388-17125-M	X			
1369-17065-4		X		

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